

CLAIMS:

1. An oil-in-water nanoemulsion, comprising:

an oily phase dispersed in an aqueous phase;

(i) at least one amphiphilic lipid selected from the group consisting of nonionic

amphiphilic lipids, anionic amphiphilic lipids, and combinations thereof; and

(ii) at least one water-soluble nonionic polymer selected from the group

consisting of homopolymers and copolymers of ethylene oxide; polyvinyl

alcohols; homopolymers and copolymers of vinylpyrrolidone; homopolymers and

copolymers of vinylcaprolactam; homopolymers and copolymers of polyvinyl

methyl ether; neutral acrylic homopolymers and copolymers; C₁-C₂ alkyl

celluloses and their derivatives; C₁-C₃ alkyl guar; C₁-C₃ hydroxyalkyl guar; and combinations thereof;

wherein a ratio of the weight of said oily phase to the weight of said amphiphilic lipid (i) ranges from 1.2 to 10;

and wherein said oily phase comprises oil globules having a number-average size of less than 100 nm.

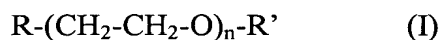
2. The nanoemulsion according to Claim 1, wherein said ratio ranges from 2 to 6.

3. The nanoemulsion according to Claim 1, wherein the oil globules have a number-average size ranging from 20 to 80 nm.

4. The nanoemulsion according to Claim 1, having a viscosity ranging from 1 to 200 Poises when measured at 25°C at 200 s⁻¹.

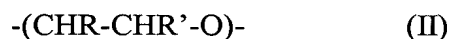
5. The nanoemulsion according to Claim 1, having a turbidity ranging from 60 to 400 NTU.

6. The nanoemulsion according to Claim 1, wherein said homopolymers and copolymers of ethylene oxide are selected from the group consisting of:
(1) poly(ethylene oxides) having the following formula (I):



in which R is selected from the group consisting of hydroxyl, methoxy and amine group, R' is a methyl group or a hydrogen, and n is a number ranging from 220 to 230,000;

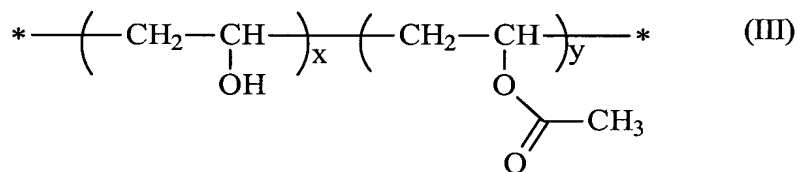
(2) copolymers of ethylene oxide and of one or more oxyalkylenated monomers having the following formula (II):



in which R and R', independently of each other, are hydrogen or an alkyl group comprising from 1 to 7 carbon atoms, at least one of R or R' being an alkyl group; and

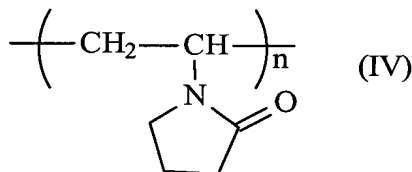
(3) combinations thereof.

7. The nanoemulsion according to Claim 1, wherein said polyvinyl alcohols are compounds having the following formula (III):



in which x is a mean number expressed as a percentage ranging from 70 to 100; and y is a mean number equal to 100 - x.

8. The nanoemulsion according to Claim 1, wherein said homopolymers and copolymers of vinylpyrrolidone are selected from the group consisting of:
polyvinylpyrrolidones having the following formula (IV):

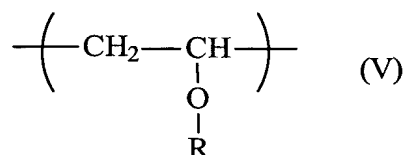


copolymers of vinylpyrrolidone and vinyl acetate;

copolymers of vinylpyrrolidone and vinylpyrrolidone derivatives with butene grafts;

copolymers of vinylpyrrolidone and malefic anhydride;

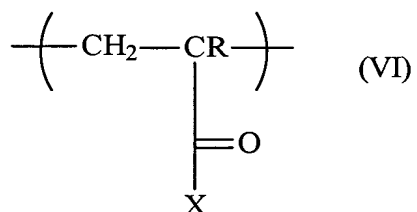
copolymers of vinylpyrrolidone with polyvinyl alkyl ethers of the following formula (V):



in which R is selected from the group consisting of alkyl groups having from 1 to 7 carbon atoms;

copolymers of vinylpyrrolidone and N-vinyl lactams;

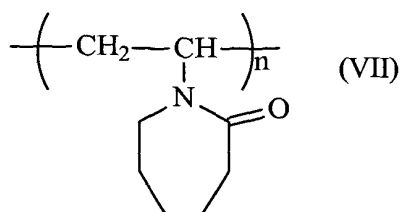
copolymers of vinylpyrrolidone with neutral acrylic derivatives of the following formula (VI):



in which R is hydrogen or a methyl group, and X is selected from the group consisting of alkyl oxide having the formula OR' where R' is an alkyl group having 1 to 7 carbon atoms; hydroxylated and/or aminated alkyl oxide having the formula $\text{OR}_1(\text{OH})_n(\text{NR}_2\text{R}_3)_m$ where n and m are each independently numbers ranging from 0 to 10, R₁ is an alkyl group having 1 to 7 carbon atoms; R₂ and R₃ are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R₂ and R₃ ranges from 1 to 7; primary, secondary or tertiary amine having the formula NR₂R₃ where R₂ and R₃ have the meaning indicated above.

9. The nanoemulsion according to Claim 1, wherein said homopolymers and copolymers of vinylcaprolactam are selected from the group consisting of:

(1) polyvinylcaprolactams which have the following formula (VII):



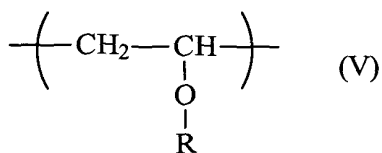
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;

(2) copolymers of vinylcaprolactams obtained from vinylcaprolactam and one or more of the following monomers:

- vinyl acetate;
- N-vinyl lactam;
- maleic anhydride;
- vinyl alkyl ethers of formula (V);

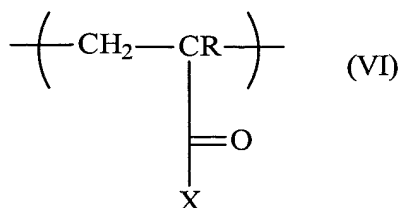
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15 in which R is selected from the group consisting of alkyl groups containing from 1 to 7 carbon atoms;

- neutral acrylic derivatives of formula (VI)

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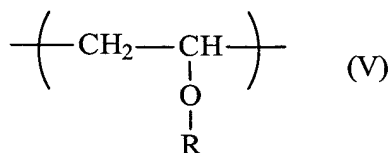


in which R is hydrogen or a methyl group, and X is selected from the group consisting of alkyl oxide having the formula OR' where R' is an alkyl group having 1 to 7 carbon atoms;

- 5 hydroxylated and/or aminated alkyl oxide having the formula $\text{OR}_1(\text{OH})_n(\text{NR}_2\text{R}_3)_m$ where n and m are each independently numbers ranging from 0 to 10, R₁ is an alkyl group having 1 to 7 carbon atoms; R₂ and R₃ are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R₂ and R₃ ranges from 1 to 7; primary, secondary or tertiary amine having the formula NR₂R₃ where R₂ and R₃ have the meaning indicated above; and
 10 (3) combinations thereof.

10. The nanoemulsion according to Claim 1, wherein said copolymers of polyvinyl methyl ether are copolymers of vinyl methyl ether and one or more of the following monomers:

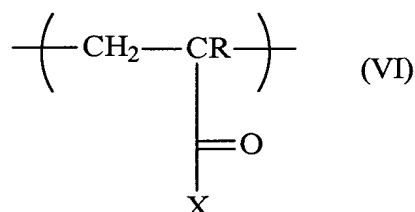
- 15 - vinyl alkyl ethers of formula (V):



in which R is selected from the group consisting of alkyl groups containing from 1 to 7 carbon atoms;

- vinyl acetate;
- N-vinyl lactam;

- maleic anhydride; and
- neutral acrylic derivatives of formula (VI):



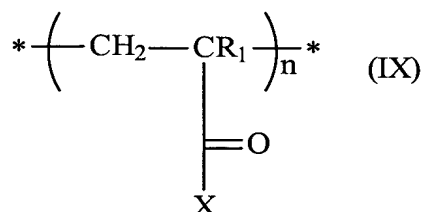
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in which R is hydrogen or a methyl group, and X is selected from the group consisting of alkyl oxide having the formula OR' where R' is an alkyl group having 1 to 7 carbon atoms; hydroxylated and/or aminated alkyl oxide having the formula $\text{OR}_1(\text{OH})_n(\text{NR}_2\text{R}_3)_m$ where n and m are each independently numbers ranging from 0 to 10, R₁ is an alkyl group having 1 to 7 carbon atoms; R₂ and R₃ are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R₂ and R₃ ranges from 1 to 7; and primary, secondary or tertiary amine having the formula NR_2R_3 where R₂ and R₃ have the meaning indicated above.

11. The nanoemulsion according to Claim 1, wherein said neutral acrylic copolymers and homopolymers are selected from the group consisting of:

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- neutral water-soluble acrylic polymers having the following formula (IX):



in which R₁ is hydrogen or a methyl group, and X is selected from the group consisting of (a) and (b):

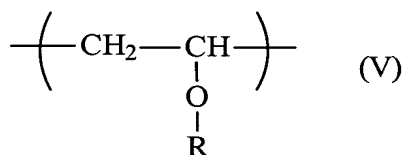
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(a) alkylamino groups having the formula NR_2R_3 , wherein R₂ and R₃ are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R₂ and R₃ ranges from 1 to 7, and wherein the resulting acrylic polymer is water-soluble; and

(b) hydroxylated and/or aminated alkyl oxide groups having the formula $OR_2(OH)_n(NR_3R_4)_m$, wherein n and m are numbers ranging from 0 to 10, R_2 is an alkyl group having from 1 to 7 carbon atoms, R_3 and R_4 are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R_3 and R_4 ranges from 1 to 7, and wherein the corresponding acrylic polymer is water-soluble;

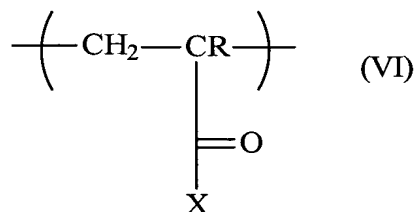
- copolymers of an acrylic polymer of formula (IX) and one or more of the following neutral monomers:

- vinyl acetate;
- N-vinyl lactam;
- maleic anhydride;
- vinyl alkyl ethers of formula (V):



in which R is selected from the group consisting of alkyl groups containing from 1 to 7 carbon atoms;

- neutral acrylic derivative of formula (VI):



in which R is hydrogen or a methyl group, and X is selected from the group consisting of alkyl oxide having the formula OR' where R' is an alkyl group having 1 to 7 carbon atoms; hydroxylated and/or aminated alkyl oxide having the formula $OR_1(OH)_n(NR_2R_3)_m$ where n and m are each independently numbers ranging from 0 to 10, R_1 is an alkyl group having 1 to

7 carbon atoms; R_2 and R_3 are each independently hydrogen or an alkyl group such that the sum of the carbon atoms of R_2 and R_3 ranges from 1 to 7; and primary, secondary or tertiary amine having the formula NR_2R_3 where R_2 and R_3 have the meaning indicated above.

5 12. The nanoemulsion according to Claim 1, wherein said C_1 - C_2 alkyl celluloses and their neutral derivatives are selected from the group consisting of hydroxyethyl cellulose; ethylhydroxyethyl cellulose; methyl cellulose and methylhydroxyalkyl celluloses.

10 13. The nanoemulsion according to Claim 1, wherein said water soluble nonionic polymer (ii) is hydroxypropyl guar.

15 14. The nanoemulsion according to Claim 1, wherein said water-soluble nonionic polymer is present in an amount ranging from 0.01 to 20% by weight relative to the total weight of the composition.

20 15. The nanoemulsion according to Claim 1, wherein said nonionic amphiphilic lipid is one or more selected from the group consisting of:

(1) silicone surfactants,

(2) amphiphilic lipids which are liquid at a temperature of less than or equal to 45°C and which are selected from the group consisting of esters of at least one polyol and of at least one fatty acid having at least one saturated or unsaturated and linear or branched C_8 - C_{22} alkyl chain,

(3) esters of fatty acid and of sugar,

(4) ethers of fatty alcohol and of sugar,

(4) surfactants which are solid at a temperature of less than or equal to 45°C and which are selected from the group consisting of glycerol fatty esters, sorbitan fatty esters, oxyethylenated sorbitan fatty esters, ethoxylated fatty ethers, and 5 ethoxylated fatty esters,

(5) block copolymers of ethylene oxide and of propylene oxide, and mixtures thereof.

30 16. The nanoemulsion according to Claim 1, wherein said amphiphilic lipid (i) is present in an amount ranging from 0.2 to 15% by weight with respect to the total weight of the composition.

17. The nanoemulsion according to Claim 1, further comprising at least one additional ionic amphiphilic lipid.

18. The nanoemulsion according to Claim 17, wherein said additional ionic amphiphilic lipid is present in an amount ranging from 0.01 to 10% by weight with respect to the total weight of the composition.

19. The nanoemulsion according to Claim 1, wherein said oily phase is present in an amount ranging from 2 to 40% by weight with respect to the total weight of the composition.

20. A cosmetic or dermatological composition, comprising the nanoemulsion as claimed in Claim 1.

21. An ophthalmic vehicle, comprising the nanoemulsion as claimed in Claim 1.

22. A pharmaceutical composition, comprising the nanoemulsion as claimed in Claim 1.

23. A method for caring for, treating, or making up the skin, face, or scalp, comprising applying the nanoemulsion as claimed in Claim 1 to the skin, face, or scalp.

24. A method for caring for or treating the hair, comprising applying the nanoemulsion as claimed in Claim 1 to the hair.

25. A method for caring for or moisturizing the skin, mucous membranes, or scalp, comprising applying the nanoemulsion as claimed in Claim 1 to the skin, mucous membranes, or scalp.

26. A method of making a composition intended for the treatment of dry skin, comprising admixing the nanoemulsion as claimed in Claim 1 with said composition.

27. A method of making an ophthalmological composition, comprising admixing the nanoemulsion as claimed in Claim 1 with said composition.

28. A method for preparing the nanoemulsion as claimed in Claim 1, comprising:

5 contacting said oily phase with said aqueous phase with high pressure homogenization to obtain a first nanoemulsion, and
 thereafter contacting said nanoemulsion with said water-soluble nonionic polymer (ii) to obtain said nanoemulsion as claimed in Claim 1.

10 29. A method for thickening an oil-in-water nanoemulsion having oil globules whose number-average size is less than 100 nm, comprising contacting said nanoemulsion with at least one water-soluble nonionic polymer selected from the group consisting of
homopolymers and copolymers of ethylene oxide; polyvinyl alcohols; homopolymers and copolymers of vinylpyrrolidone; homopolymers and copolymers of vinylcaprolactam;
15 homopolymers and copolymers of polyvinyl methyl ether; neutral acrylic homopolymers and copolymers; C₁-C₂ alkyl celluloses and their derivatives; C₁-C₃ alkyl guar; C₁-C₃ hydroxyalkyl guar; and combinations thereof.

20 30. The method according to Claim 29, wherein said nanoemulsion further comprises (i) at least one amphiphilic lipid selected from the group consisting of nonionic amphiphilic lipids, anionic amphiphilic lipids, and combinations thereof

25 31. The method according to Claim 29, wherein a ratio of the weight of said oily phase to the weight of said amphiphilic lipid (i) ranges from 1.2 to 10.

 32. The method according to Claim 29, wherein said thickening comprises increasing the viscosity of said nanoemulsion by at least a factor of 5.

33. An oil-in-water nanoemulsion composition, comprising:

30 an oily phase dispersed in an aqueous phase;
 (i) a means for emulsifying said composition; and
 (ii) a means for thickening said composition;

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